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ABSTRACT

This newsletter presents the results of a National Governors' Association (NGA) survey, conducted November 1986 through January 1987, on state responses to the recommendations of the NGA Task Force on Technology regarding new ways to acquire and use educational technology. The following topics covered by the survey are discussed: (1) hardware concerns, including the value of a state role in assisting school districts with hardware evaluation and quality control, aggregate purchasing, bidding, and creating special authorities to serve district needs; (2) instructional software acquisition at reduced cost through purchasing agreements with producers; (3) efforts to share the costs of videotape development and video programming; (4) issues to be considered in managing the process of market aggregation, including selection mechanisms, purchase agreements, distribution, and training for teachers and administrators; (5) the role of technology in restructured schools; and (6) the need for a central source of information about the impact of technology in schools. (MES)

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Capital Ideas

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TECHNOLOGY'S ROLE IN EDUCATIONAL REFORM

INTRODUCTION

Although millions of dollars worth of computers, video cassette recorders, laser discs, and overhead projectors have been purchased by schools and school districts, educational technology has not been integrated into school operations in ways that produce significant achievement in academic gains, or significant reductions in costs. Yet, emerging technology has enormous, generally untapped potential to help schools become more productive. In Time for Results: The Governors' 1991 Report on Education, the NGA Task Force on Technology recommended new ways to acquire and use educational technology.

Time for Results... includes a vision of transformed educational systems, making much more sophisticated use of emerging technologies. It stresses the importance of employing a range of machines, not just computers. It urges the states individually and collectively to rethink methods of acquiring hardware and software to minimize cost and assist in creating quality control devises.

This issue of **Capital Ideas** presents the results of an NGA survey, conducted November 1986-January 1987, on state responses to the recommendations of the Task Force. It shows that the states can play a central management role in assisting school districts and schools with the use of technology for instructional purposes. This is being done through assistance in hardware evaluation and acquisition, software evaluation and acquisition, and planning and staff training.

HARDWARE

Despite the explosive growth of computers in schools throughout the nation, some states are getting much more for their technology expenditures than others. Between 1981 and 1985, the number of computers in this nation's public schools grew from 30,000 to almost 2 million. By purchasing computer hardware and software in bulk for their schools, several states are reducing costs by 25-50 percent.

Market Aggregation

Some states are already achieving significant savings by making large purchases. The survey found that 33 state departments of education have developed procedures which allow school districts to purchase computers and, in some cases, other machines at reduced prices. These include Arizona, Arkansas, California, Colorado, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Kentucky, Louisiana, Maryland, Massachusetts, Minnesota, Mississippi, Montana, Nevada, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, and West Virginia. (Several other states were developing procedures when the survey was conducted.)

These 33 states either have negotiated agreements with hardware producing companies on behalf of schools, or allow schools to buy from bid agreements which supply the state government with the computers. State education department officials report that schools benefit not only from reduced prices, but also from the

opportunity to have experts develop the complex bid specifications. Officials from several states say that many of their smaller districts do not have the personnel to complete such specifications.

Minnesota was the first to push a statewide contract to purchase computers in the late 1970s. The state asked the Minnesota Education Computing Consortium (MECC), a legislatively-established public non-profit corporation, to test personal computers produced by different companies. The legislature wanted to know which had the most appeal for public schools. After intensive review and discussion, MECC developed a bid which specified desirable characteristics of a computer to be used in schools. Several companies competed for the bid. The company which won the contract sold thousands of computers to Minnesota schools at substantial discounts.

This was a win-win situation: schools were able to purchase the computers through the contract for much less than if they had negotiated directly with the company, and the company did not have to send salespeople to each school district, thus enabling it to make money while selling at a substantial discount. MECC began to produce educational software for this computer. For several years, much of the educational software for personal computers was available only for this brand. Not surprisingly, most school districts purchased it.

Arkansas offers another model. About four years ago, Governor Bill Clinton and several prominent business people convened to discuss whether computers could help improve the basic skills of the state's children. They decided to establish an experiment, entitled Project IMPAC (Instructional Microcomputers Project for Arkansas Classrooms). IMPAC operates as a separate organization, supervised by the Arkansas Department of Education.

The project compared the results of using several different kinds of computers in schools. It found that while equipment produced by one company initially was less expensive, within two years, repair cost factors made the "best buy" more expensive.

Project IMPAC now makes an attractive offer to school districts in Arkansas by offering computers at dealer cost (15-25 percent below list price) and by providing $18,000-20,000 worth of software for about $5,000. Districts are not forced to participate, but about 1/3 of the state's districts do work with IMPAC.

Many other states have negotiated contracts directly with hardware producers. Tennessee recently purchased 7,000 computers, one for each thirty seventh and eighth graders, and placed them in its middle and junior high schools. The terminals are used in state-mandated computer literacy courses. Tennessee Department of Education officials estimate that the state received a discount of approximately 50 percent from list price for this major purchase. Two years ago, California purchased 7,350 video cassette recorders, enough for each public school in the state. Ira Barkman, technology coordinator for the California Department of Education, estimates that the statewide purchase saved schools (and taxpayers) almost 30 percent from list price.

The experience of the states shows real value in a state role in assisting school districts in:

- hardware evaluation and quality control;
- aggregate purchasing;
- bidding; and
- creating special authorities to serve district needs.

SOFTWARE

Acquisition

While about 60 percent of the states have developed contracts for hardware, less than half have signed similar agreements involving software. The states with such programs report even larger discounts than are available from hardware producers.

The survey found that 24 states had agreements with software producers. A predominant feature of these contracts was that only "administrative" or "application" (such as electronic forecasting, data-based management and word processing) software be provided, rather than "instructional" software. States with contracts involving at least one software company include Alaska, Arkansas, California, Colorado, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Iowa, Kentucky, Louisiana, Maryland, Minnesota, Nebraska, Nevada, New York, Oregon, Pennsylvania, Texas, Utah, Virginia, and West Virginia.

Again, Minnesota's Educational Computer Consortium pioneered the idea of selling states large quantities of software (and rights to duplicate that software) at prices considerably below the cost of individual programs. This idea was expanded by the Minnesota Technology and Educational Improvement Act of 1983, which permits the Department of Education to purchase rights to duplication of courseware packages and establish volume purchase agreements "if the Department determines that the courseware packages are available to the state at a lower cost than if purchased by school districts." The Department spent $150,000 during each of the first two years following enactment of this legislation. The Department purchases duplication rights to programs "based on their quality and contribution to education, ease of use and applicability to many subject areas."

Under this plan, Minnesota school districts received copies of popular software which, for example:

- allows schools to make different kinds of certificates and notices;
- brings together word processing and graphics generation capabilities; and
- assists with drivers education by tutoring students on state driving laws and simulating drinking and driving situations.

The Minnesota Department of Education also negotiated agreements enabling Minnesota school districts to obtain additional copies of these and other software packages at far less than retail costs.

Gil Valdez, Manager of Curriculum and Technology for the Department, says the state has obtained discounts ranging from 50 to 90 percent below the cost of each district purchasing the software on its own. Valdez points out that teams of educators from around the state helped select the software which was purchased. This increases the likelihood that it will be used.

California and New York are other states that have been able to stretch state funds for educational software. California purchased several thousand copies of packages found to be outstanding in evaluations by teachers, and distributed these materials along with curriculum guides to schools throughout the state. New York State, through its coordinating units (Board of Cooperative Education Services - BOCES) has obtained 15-30 percent discounts on software. Both California and New York distributed software at training sessions. Educators were not given the material

unless they attended these sessions where different applications were discussed. Officials in these two states agree that the training programs were critical. "We know from past experience that simply distributing material does not mean it will be used. Mass distribution, unaccompanied by high quality training, will not produce widespread use," according to one education department official.

OTHER EFFORTS TO AGGREGATE PURCHASES

Computer-related hardware and software market aggregation lends itself to local-state arrangements. Some other types of technologies are ripe for multistate arrangements. For the last fifteen years, states shared costs of videotape development under the auspices of the Agency for Instructional Technology (AIT). This group has created 21 separate products at a cost of more than $25 million dollars. States pay a fee to help develop each product they decide will be useful for their schools. Each of these products is distributed free to all school districts whose states participated in the development. Nineteen of AIT's products are videotapes; two are computer programs. Because states and provinces pool their money, they have obtained educational material at a tiny fraction of the full development cost. Each of the 50 states has participated in several of AIT's projects; at least 35 states regularly participate.

Several other groups are attempting to save money while aggregating markets. In late 1986, 16 states and 5 Canadian provinces established the Software Communications Service (SCS). Three more states recently joined the group. In its founding statement, the SCS cited NGA's Time for Results... recommendations as a key rationale for its establishment. The SCS may build on the model of instructional television (ITV).

For more than a decade, instructional television has supplied video programming to over 35,000 schools across the U.S. and Canada. SCS staff hope that they will be able to negotiate agreements with software developers, permitting them to obtain large price reductions by combining purchases from many states. The software may be distributed via ITV or other media. A number of payment patterns are being considered, including purchase, lease, and rental for the period of time the software will be used. Participants in the SCS include California, Connecticut, Delaware, Illinois, Indiana, Iowa, Maryland, Mississippi, Nebraska, New Jersey, North Carolina, Ohio, Pennsylvania, South Carolina, Virginia, Washington, Ontario, Alberta, Saskatchewan, British Columbia, and Manitoba.

MANAGING THE PROCESS

While the aggregation of hardware and software markets can allow states to stretch the dollars committed to education, the survey identified a number of issues which need to be incorporated in a state's initiative. These include procedures for:

- selection of products;
- purchase agreements;
- distribution; and
- training.

Policy issues include balancing permissive versus mandatory district participation, and impact of market aggregation on the kind of products developed. Either individually or collectively, states will have to resolve these issues.

Selection mechanisms

One of the first questions involves the selection process. Who will be involved? In states most satisfied with the market aggregation process, educators from throughout the state, representing different kinds of

districts, worked closely with department of education officials to select products. No matter how representative the group, some districts and schools will prefer other products. State department officials suggest that districts retain the right to purchase materials other than those selected for major, large-scale purchases. However, some states have decided that certain materials must be used in all schools. This is particularly true in states with uniform fiscal and student reporting requirements. Also, the ability of local jurisdictions to have freedom of choice in purchases will differ in software versus hardware purchases.

Agreements

After hardware and software are selected, states must develop agreements with their producers. The details of these contracts will vary, but state department of education officials made several suggestions. They emphasized the importance of negotiating on behalf of small as well as large districts. Otherwise, the difference in acquisition costs may actually increase. (Large districts could obtain major discounts while small districts would have to pay close to list price.) To meet supplier requests for large purchases in exchange for major discounts, states may guarantee a certain number of purchases or buy in quantity for distribution to each district.

Distribution

No one is sure about the best method to send software from the state (or software producer) to the school and classroom. Should it be leased or purchased? Should it, for example, be mailed, sent via satellite, instructional television, or telephone lines? During the next few years, there will be a need to experiment with different approaches. The NGA Task Force on Technology urged states to work together on this kind of research, and asked the federal government to help compile, analyze, and share research results.

Training

Regardless of what is purchased or leased, most states find that high quality training will enhance the effectiveness of emerging technology. Simply sending hardware and software to district officials is unlikely to produce the maximum possible impact on student learning. Though related to market aggregation, training clearly is a separate, vital issue.

One executive of a software company believes it is critical that teacher training accompany the purchase of software. This executive has found that unless teachers receive training on software, much of the material will not be used, or will be underused. Obtaining software inexpensively is not cost effective if most teachers do not know how to integrate it into classroom activities. This company has participated in several market aggregation programs, discounting software from 15 to 30 percent in New York, California, and Minnesota, and has found that states most successful in the use of software are those states in which educators are trained to use that software.

Training can be provided in various ways by different people. Some states will hold regional workshops; others will conduct them in one central location. Some will rely on a few trainers selected by the state, while others will rely on each district for training. States may face a problem recently identified by the Rand Corporation (Teaching Math and Science Patterns of Microcomputer Use). Rand researchers found that many of the most outstanding "computer using" and otherwise technologically-sophisticated teachers and administrators are leaving the profession. These people often have been asked to

provide training. The private sector has hired many of these people.

Relying on the private sector to provide training is controversial. Some states and districts are pleased with the results of such arrangements. Others question it, explaining that employees of a corporation, even former educators, are less likely to give a completely unbiased view. Some educators report that training programs conducted by professional educators are more effective and inclusive than those conducted by private sector employees.

WILL TECHNOLOGY HAVE A ROLE IN RESTRUCTURED SCHOOLS?

States presently are sponsoring or encouraging several kinds of experiments which use technology to change the way learning and teaching occurs. Two states are experimenting with entreprenuerial arrangements involving technology. In Texas, a for-profit corporation owns satellites and sells classroom and teacher inservice instruction for small districts. The continued renewal of contracts indicates that school districts are pleased with the quality of this service. In Illinois, a former public school administrator has established programs for high school dropouts involving sophisticated uses of machines and new roles for teachers. This program, called Ombudsman, contracts with school districts. Each center has one teacher, approximately 50 students, and several teacher aides. Graduation comes when students have demonstrated certain competencies. Instruction is heavily computer-based, with the teacher supervising students and the aides. Results have been impressive, with significant numbers of students who previously failed gaining basic and applied skills. The Ombudsman program costs no more per student than the average cost for any other program.

Some experiments involve the use of "distance learning." In states such as Texas, Utah, Oklahoma, and Alaska, satellites bring instruction to students sitting in classrooms hundreds of miles away from the teacher. These arrangements permit students to take specialized courses for which teachers are not available in their local district. Similar programs using cable television have been created in New York and Minnesota. While start-up costs of these programs are high, educators and researchers want to determine if, over a several year period, savings can be achieved, compared to the cost of providing a teacher at the local site or busing students to a central location.

REMAINING ISSUES

Educators are eager for a better source of information about results of different programs. Every one of the more than 80 state and national authorities contacted in the survey noted that the lack of a central source for information about the impact of technology in schools is a serious problem. For example, more research is needed on instructional effectiveness of various types of technology. Other than conferences, electronic networks, magazine articles, and books, formal mechanisms do not exist for educators to learn from peers' experiences about either the administrative or instructional aspects of educational technology.

The federally-funded Educational Technology Center at Harvard has recently started re-evaluating its mission because of these information gaps. Charles Thompson, co-director of the Center, says its priority has been to conduct research on the ways in which technology can help students understand complex scientific and mathematical concepts. ETC has developed several products which seek to

use the computer's power to help students improve higher order skills of analysis, synthesis, and problem-solving. While continuing this work, ETC has commissioned a study of ways it might begin to respond to the increasing number and range of questions about how schools can most effectively employ technology's power and capabilities. Thompson says the Center has not yet decided whether to take a major role in gathering, analyzing, and disseminating answers to these questions, important as they are.

Policymakers and educators recognize that there must be an institutional source of accurate, timely information on technological applications in education. The federal government could play a central role in meeting this need. This is critical if educational technology's frustrating history of unrealized promises is to end. The Technology Task Force stated, "This obstacle can be overcome only if the states, the major educational organizations, and a recognized neutral organization that builds and provides a database, such as the Federal Office of Educational Research and Improvement or National Technical Information Service, come together to provide available, useful information."

Nevertheless, response to the NGA report has been encouraging. Several states are exploring market aggregation and restructing possibilities. The number of cooperative efforts among states examining technology's educational applications is increasing. Over the next few years, it is possible that policymakers will witness what has not occurred before: successful efforts to use machines to help schools become significantly more productive.

INFORMATION IS AVAILABLE

Agency for Instructional Technology
Box A
Bloomington, Indiana 47204
(812) 339-2203

For information about instructional videotapes available from the Minnesota Department of Education, call (612) 296-6114

Minnesota Software State Rights Agreements
Minnesota Department of Education
Capitol Square Building
550 Cedar
St. Paul, MN 55101
(612) 297-2534
Contact: Harold McDermot

Software Communications Service
Central Educational Network
1400 East Touhy Avenue, Suite 260
Des Plaines, Illinois 60018-3305
(312) 390-8700
Contact: Joe Nathan

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Capital Ideas is published periodically by the National Governors' Association Center for Policy Research. It reviews research activities and findings on a variety of subjects and discusses issues of current interest to states. Subject area codes, listed below, are shown on page one, along with year of publication and issue of publication for that year. **Capital Ideas** also provides an opportunity for open exchange of information among states, with issues focusing on innovative programs in states, as well as new ideas and experiments.

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